SCIENCE AND INDUSTRY

ORGANIC GARDENING

MAY 1943
LOS ANGELES PUBLIC LIBRARY
STACKS
STACKS
PUBLIC LIBRARY
ST
CALIF
REFERENCE
DO NOT LOAN

Table of Contents

THE WRITING ON THE WALL — *INSIDE FRONT COVER*
WITH THE EDITOR 1
HINTS FOR THE VICTORY GARDENER 4
MULCHING GARDEN CROPS WITH CORN COBS 8
COMPOST AND THE ORCHARD 10
HOW SOLAR ENERGY IS WASTED 11
SPEEDING INDORE COMPOST BY THE PETTY METHOD 12
SPRING NOTES ON GROWING VEGETABLES 14
THE JAPANESE BEETLE IGNORES A BIO-DYNAMIC GARDEN 17
SCIENCE MAKES THE WORM TURN 18
TO THE RESCUE OF THE SOIL 18
OUR DAILY BREAD 19
HEALTH FROM PROPERLY RAISED FOOD 22
EARTHWORM DEPARTMENT 23
THE EARTHWORM 24
READER'S CORRESPONDENCE 25

HELP THE WAR EFFORT
USE ONLY HOME-MADE ORGANIC FERTILIZERS

APRIL, 1943

A RODALE PRESS Magazine

25c

The Writing On the Wall

By Sir Albert Howard, C.I.E.

ANY proposal for improving crop-production to be of value must pass the test of time before it can be welded into the fabric of good husbandry. Only a very few of the many innovations put forward manage to stay the course. The majority prove to be mere mushroom ideas based on nothing more substantial than the transfer of the earth's capital—soil fertility—from the balance-sheet to the profit and loss account.

What is the real status of chemical fertilizers in agriculture? Are they of real and permanent value to the farming community? How have they stood up to the test of time?

We can answer these questions by observing what has happened to the cane-sugar industry in one of our oldest West Indian colonies—Barbados—where the production of sugar has been carried on for many years, at first by means of humus only, then by humus and artificials, and of late years by artificials with little or no help from live stock.

I spent three years (1899-1902) in Barbados as a research officer of the newly formed Imperial Department of Agriculture for the West Indies and had ample opportunities for the study of the local sugar industry, the main crop of the island. Soil fertility was then maintained partly by a rough kind of farm yard manure (known locally as pen manure) obtained from the dried leaves of the cane crop and the wastes of the live stock—oxen, mules and horses—and partly by various mixtures of chemical manures. A definite movement was even then in progress to give up pen manure and to replace it by NPK (Nitrogen, Phosphorus, Potash). This step was strongly urged by the officers of the Department in the study of soil fertility, on the score of cheapness.

The response of the cane to these methods was interesting. It was beginning to lose the power of vegetative reproduction. This was indicated by two things: (1) The old Bourbon variety, which stood the island in such good stead before artificials were heard of, was almost entirely given up, as it was unable to resist the inroads of a fungus disease; (2) The new seedling canes, which had replaced the Bourbon, were not proving completely satisfactory, and much time and money were being devoted to the search for a cane which was as easy to handle as the old Bourbon. Obviously there was something wrong somewhere. Years afterwards it occurred to me that the root of the mischief was the interruption of the free circulation of protein between the soil, the plant and the animal, and back again to the soil by way of humus brought about by the insertion of a substitution phase in the natural cycle by the use of artificial manures.

If this view is correct, it would follow that the more this circulation of high-quality protein is impeded the more the cane would become liable to disease and the more difficult vegetative reproduction would be. The new seedling canes would run out quickly and eventually the sugar industry itself would show definite signs of collapse. The writing on the wall would become more definite.

Forty years have elapsed since 1902 when I left Barbados. Artificials have tended more and more to replace pen manure and when the internal combustion engine provided a "cheaper" form of road transport and a "cheaper" power unit for cultivation, the number of animals on the sugar estates rapidly dwindled and the supplies of properly constituted humus almost vanished. The result of all this on the cane is exactly what would be expected. Seedling after seedling has been tested, tried out and rejected. Virus diseases, a sure sign that all is not well with the vital circulation of protein, have increased. The writing on the wall has become much more definite; the messages from Mother Earth that all is not well with the soil have been more and more insistent.

(Continued on inside back cover)

XUM

ORGANIC GARDENING

EMMAUS, PA.

Vol. 2, No. 5, April, 1943 | $2.00 a year | 25c a copy

J. I. Rodale—Editor | Sir Albert Howard, C. I. E., M. A., Associate Editor

With the Editor

CAUTIONS—

As the season begins let me caution you in regard to a few of the pitfalls that are awaiting you in connection with your gardening plans.

Manure

I have noticed for sale in some of the stores bags of COW manure, with a notation in small letters near the bottom that superphosphate has been used as an absorbent. Superphosphate is a chemical fertilizer. It is made by treating ground phosphate rock with sulphuric acid. Ground phosphate rock alone is a good, organic fertilizer, but it is slow acting. If you are desirous of eliminating all of the artificial fertilizers, watch the labels on all bags of fertilizers.

If your garden or farm is close to a factory district your soil is no doubt made acid from the smoke and fumes. Liming is very important in such cases.

Where you are going to tear up a lawn to make a vegetable garden, it is better to take off the sod and place in a compost heap for break-down before use. If you plow under this sod it may interfere with the proper growth of your vegetables.

If your lawn has been sprayed with the deadly poisons such as lead arsenate, etc., to control grubs, Japanese beetles, etc., it is safest not to use it for a vegetable garden, as vegetable plants will assimilate some of the poison. The U. S. Bureau of Entomology has made tests which prove this and also that lead arsenate residues in the soil injure plant roots.

Do not burn off weeds or make fires on land where you want anything to grow. Such heat kills bacteria, earthworms and other beneficial soil organisms and beneficial insects.

If you use garbage be sure it is thoroughly decayed by composting. The use of raw, undecayed garbage has caused much trouble. In California where it was placed around orange trees, many persons who ate the oranges came down with serious intestinal disorders. A passage from Dr. Ehrenfreid Pfeiffer's book "Grow a Garden" is also to the point.

"A special monument should be erected in honor of city sanitation departments! In the en-

Rodale Press. Executive and Editorial offices, 6th and Minor Sts., Emmaus, Penna. Subscription rates 10 issues for $2.00 **ORGANIC GARDENING**, published 10 times a year by Rodale Press, 6th and Minor Sts., Emmaus, Penna. Entered as second class mail at the post-office at Emmaus, Penna., under the act of March 3, 1879. Printed in U.S.A.

XUM

virons of Paris there are gigantic heaps, upon which the total, unsorted contents of the garbage cans is piled up week in, week out. The heaps slowly smolder away, weather and decay, emanating unsavory odors. After years they yield a kind of compost earth of doubtful value. Often it is too tiresome for the farmer and gardener to wait until the fermentation is completed, and this half-decayed refuse is ploughed or spaded in. We have seen people working in a field where the potatoes had to be planted amid broken glass, bits of lead pipe, tar paper, garbage and old newspapers. Here we find the origin of countless infections, which start up in the slightest wounds, as well as the reason why Parisians are almost all afflicted with worms. A comparison should be made between the rate of tetanus in such regions and the rate in regions where a careful, selective composting is practiced."

Do not throw dish water on compost heaps. It contains strong chemicals from the soaps which are corrosive and dangerous in action.

Don't try to get magic results by using chemical seed treatments. The Government in tests at 3 experimental stations could find no significant increase in the yield with the use of such chemically treated seed. If you will enrich your soil with well-made composts and stick to wholesome, natural methods you will obtain more than satisfactory results.

Of recent years practically all seed houses are treating their seeds with dangerous, poisonous mercury and other compounds to kill off disease organisms. If seeds are grown in healthy soil full of organic material such measures won't be necessary. It is just as if a person takes medicine as a preventative for disease. That practice has been thoroughly debunked. The dangerous compounds used on the seeds are to a certain extent absorbed by the plants. When buying seeds find out if they have been chemically treated.

Don't be too quick to adopt some neighbor's or friend's discovery of a method to prevent insect infestation. The cure may be worse than the disease, as was the case where mothballs were tied to each plant. Do you want to eat peas tasting of the essence of mothballs?

Don't allow grass to grow under fruit trees. Put some kind of mulch, (straw, corn cobs, hay, etc.) under the tree, applying manure or compost under it. The results will be remarkable.

In making compost heaps beware of the use of stubborn items which will not easily break down. One such material is corn stalks. It must be finely shredded before placed in the heap. Corn cobs must be ground up first. Apple pomace, the skins of apples which remain after the juice has been squeezed out, are exceptionally stubborn. They may also contain dangerous metallic spray poisons which do not break down. Heavy woody twigs must be finely crushed first.

In choosing lime for the compost heap, bear in mind that quick lime is the best to use. If you cannot obtain it the next best is hydrated lime. The third best is ground limestone. The latter is very slow acting. The worst form of lime is gypsum which is used in house plastering work. It was formerly known as land-plaster because it was widely used in the soil. It is sulphate of lime and its use makes the soil acid, just the opposite of what ordinary lime is supposed to do.

Wood ashes is better than lime in the compost heap, and that made from hard wood is better than from soft wood. Greenhouse people buy hard wood ashes which they use extensively as a fertilizer.

Do not use coal ashes as a fertilizer. While it is not as bad as chemical fertilizers it does contain small amounts of strong sulphites which are detrimental in the scheme of organic gardening. Many persons claim they get good results with it, but no doubt would get a better crop without it. Soot also is taboo.

Dehydration of Foods

Under conditions of war the dehydration of foods is being engaged in on a colossal scale. Its machinery and processes are being perfected and refined. There is nothing that can be said against this now, because war requires it. To win victory we must make sacrifices of personal convenience and do things we wouldn't dream of under conditions of peace. There is a great saving of shipping space when dehydrated foods are sent to our allies and our soldiers. All the water and air are squeezed out of it.

We see statements in the press that such wonderful machinery will be in existence af-

XUM

ter the war, for dehydrating foods, that it will be adopted as a permanent thing, and the public will be educated through advertising to use such dehydrated foods as eggs, milk, etc. Say the dehydration advocates, "Why should the milkman carry a product around town which is 88% water, when anyone can supply water from the kitchen tap." But what a different kind-of-water. Take any food product, apples for example. Nature's water which it contains cannot be mentioned in the same breath with sink water, with its chemical treatments. Is there any one who would question that nature's water contained in such foods as oranges, vegetables, etc., has magic, potent qualities that the family tap, pump or cistern cannot approach within 50%? Do you know that more than one-half of shallow wells (non-artesian) in rural communities are contaminated?

There is a vicious tendency by food manufacturers by which they will take out important elements of food, and then proceed to enrich it with only a small portion of what they have taken out. This is the case with vitamin B enriched bread. The wheat is robbed of the best portion, the wheat germ and the bran coating, which contains not only vitamins but extremely valuable minerals. The resultant product is further insulted by being bleached with chemicals, then some synthetically produced vitamins are thrown in for leavening purposes. There are many rare elements in the wheat germ and the bran which scientists as yet have not identified or learned about, when you remove them, you have a devitalized product, which a few added vitamins can never compensate for.

It is the same with the water that is removed in the dehydration processes. Such water contains many rare, valuable elements which nature has put in for a purpose. You cannot let this water disappear up the chimney with impunity. Mother nature is going to get sore and punish us. We are already eating devitalized, neutral foods, raised by commercial methods with chemical fertilizers which are contrary to nature. We are eating fruits and vegetables from which the government has proven it is impossible to remove all the residue of poison sprays. We are eating many kinds of factory produced foods which are preserved and processed with deleterious, toxic substances. We are eating breads which contain little nourishment. And now dehydrated foods!

Can real health be maintained in the community under these conditions? Good health is not merely the absence of disease. Many persons are not sick, but they are not possessed of full bodily vigor, their minds are not crystal clear. Real positive health will come when we eat food raised properly and processed properly after it is produced.

Commercial Tomatoes

The people of a certain section of Mississippi were coming down with dysentery and other intestinal disturbances some time ago and the physicians were able to track down the reason. It seems that Mississippi was competing with Texas in the growing on a large scale of tomatoes for the Chicago market. Unfortunately for Mississippi, Texas, due to a warmer climate, was able to ship tomatoes about three weeks ahead, thus earning a premium. The Mississippians proceeded to remedy this situation by using excessive amounts of chemical fertilizers, thus being able to start shipping at the same time as the Texans.

Soon there was an outbreak of epidemic proportions of dysentery. In all cases tomatoes were found to be the offender. The doctors advised everyone who liked tomatoes to grow their own, so now there are two kinds of tomatoes in a certain section of Mississippi. These facts were given to us in person by someone who was in that part of Mississippi when the trouble was discovered.

I related this story to a friend who then told me of an experience he had had in Atlantic City. He stopped at a hotel that made a specialty of tomato salads, serving big portions on large trays. He was exceedingly fond of tomatoes and called for a second large serving every day for a week. That man became so ill that he could hold nothing on his stomach for over a week. The doctor said it was caused by too much acid of the tomatoes. Could it possibly have been caused by too much chemical fertilizers used by the famous, commercial truck growers of tomatoes in nearby New Jersey?

J. I. Rodale

Hints for the Victory Gardener

GARDEN PEAS

This is the fifth of a series of articles by this author dealing with the cultivation of ordinary vegetables.

By Roger W. Smith

EVEN when served without butter, freshly picked garden peas are one of the greatest delicacies Spring will bring you from your Victory garden. They are one of your earliest crops. The plants do best in cool moist, early weather although certain strains have been developed for their resistance.

Seed peas have the ability to withstand much cold and the plant itself is tolerant to slight freezing. The seeds germinate just as soon as the temperature of the ground rises above freezing. For this reason, it is possible for you to plant seed peas in the fall and let them remain over winter in the ground where they will begin to grow just as soon as the weather is favorable.

It is best to get seed peas into the ground just as soon as you can work it.

As with many early vegetables, garden peas have a short harvest period—approximately two weeks. This means that in the planting of them you will find it most desirable to seed a couple of rows every two weeks to spread the harvest.

Early garden peas offer you a delectable crop and they do it without using much garden space, for as soon as they have finished bearing, the space they occupied may be planted to one of the late bearing crops, sweet corn, late cabbage, etc.

If you enjoyed your early peas you might find it worth while to remember that they may also be planted in late summer, to grow and mature their crop during the cool fall weather.

The plants do well in a friable loam, that is in a loam which crumbles easily. It should be rich in mature compost humus and the drainage should be sufficient so that it will dry out early and thus warm up quickly

In the wild, pea plants thrive in calcareous soils, which as you know, are soils containing their full natural share of chalk or limestone.

You will find that the cultivated varieties of garden peas also succeed in this type of soil although they demand, because of their larger and more vigorous growth, all the natural plant food they can obtain. A liberal supply of compost humus should provide the necessary plant food. The application of crushed, natural limestone or chalk aids in forming a condition most favorable for the formation and development of the bacteria which aid in the gathering and use of the available plant food.

Garden peas will not tolerate the soil loaded with chemical fertilizers. Many gardeners fail with them for this reason. You will find that even ordinary, unrotted manure has a bad effect upon them.

Garden peas belong to a curious and interesting family of plants, the Legumes. These plants form nodules around their roots in which they store the nitrogen they collect. They are peculiarly valuable to the Victory gardener because the plants and the discarded pods, when placed upon the compost heap contribute very heavily to its value. Many members of the Legume family are quite commonly grown for the sole purpose of being plowed into the ground at maturity to form what is known as green manure. In this way what they have taken from the soil is returned to it plus the valuable material the plants have ob-

XUM

tained from the air, the nitrogen.

You will find when you grow them that garden peas require plenty of moisture. They enjoy humidity. They demand the coolness around their roots during the day which is produced by the shading of the base of the plants by the material upon which they climb.

Because of this, the climbing types of garden peas will often seem to you to be very stubborn when you attempt to have them cover formal structures. They seek to conform to the lines of shade rather than to the lines of the structures themselves.

Garden peas are generally divided into two classes, the smooth-seeded and the wrinkled-seeded. The wrinkled-seeded strains are believed to have more flavor, to be slightly more hardy, than the smooth-seeded ones.

Probably you will decide that it is more convenient, for the purposes of a Victory garden, to think of them as climbing types and bush types. Later on, after you have grown them for a few seasons you will come to think of them, more than likely, as belonging to two great classes—the edible-seeded varieties and the edible-podded varieties.

Among the old-fashioned, cottage type of climbing garden peas the tall growing strains (Alderman, Marrowfat, and Thomas Laxton—all around 74 days to maturity) require support between five and six feet high. You will find that strains of this kind are the really heavy bearers. They produce a fine crop over a comparatively long period.

These climbing types are close to their wild ancestors. They enjoy a moderate amount of competition. As with most climbing plants, they succeed in the wild by climbing over other plants and reaching the sunshine necessary for their full development through the support of the plants upon which they climb and whose shade they use to promote the root coolness necessary for their own comfort.

Therefore you will find the manner of their planting and the arrangement of the material over which they are to climb a matter of considerable importance.

Over the area to be used for garden peas it is a good plan to dig in a layer of mature compost humus about six inches deep on which a good covering of crushed natural limestone or chalk has been added.

After the ground has been dug and well prepared, lay down another layer of the same material about two inches deep along the line where the first row of peas are to be planted.

Using a long cord as a guide line, form a trench with the corner of the hoe about six inches deep. If you plant the seed peas in the bottom of this trench about an inch deep and an inch apart—again using the hoe to form the shallow groove—they will not need to be thinned later.

Firm the soil well after planting to prevent the seeds from floating to the surface during heavy rains and thus being exposed to pigeons and other birds which use them for food.

As soon as the seedlings are an inch high, it is best for you to begin breaking down the sides of the trench. Permit only the tips of the plants to be exposed. If you continue this procedure it will not be long before the trench is filled.

In this way you secure cool, deep-rooted plants well established in material best filled for their natural growth.

Garden peas are rank growers during their swift and brief lives. You will help them much if you flood them, whenever rains fail to come, with compost water. This has an almost magical effect upon their healthy growth and productivity.

Compost water is easily made in large quantities. Half fill a water-butt or similar large container with mature compost humus and arrange for rainwater coming from a downspout to cover this material several inches deep. If you have not started early enough and rainwater is not immediately available, ordinary faucet water will have to suffice. Permit the mixture to stand for twenty-four hours, stirring it vigorously several times during this period.

The resulting solution may be strained or siphoned off into another container and applied directly to the plants. You may be sure that the food material this mixture contains, unlike that resulting from the steeping of fresh manure, is quite ready for the use of the plants and will not burn them.

This is the sort of plant food which comes to plants growing in the wild where most of the falling rain water reaches their roots only after seeping through a layer of natural humus formed by the breaking down of the herbage of former years.

XUM

If you grow garden peas under anything like natural conditions they will flourish luxuriantly and reward you with a heavy crop of fine flavored peas. These peas you may be sure will contain their proper quota of food value available to you for the promotion of your good health as well for your enjoyment of their fine flavor.

With the conditions arranged for their proper growth and the seed peas planted, you will find it imperative to start arranging for the support of the vine. This is urgent because just as soon as the seedlings appear they are influenced by their surroundings and direct their growth with great determination.

If you plant the first two rows about twenty inches apart, one row of brush placed between these rows will serve for the support of both.

The brush, which may be branches, or similar material, should be erected between the rows so as to form a close hedge. The hole for the insertion of the stub of the brush is best formed by the driving into the ground of a heavy stake, the withdrawing of it, and the insertion of the base of the branch into the hole formed by the stake.

No matter how careful you are you may have difficulty in keeping the brush erect. It is a good idea to drive stakes to stand about five feet tall at six foot intervals around the two rows. These stakes may be connected by a network of heavy twine crisscrossed in such a way as to hold the brush secure against the damage of winds.

A little later, the next two rows may be arranged in the same manner as the first two.

It is best to have both the stakes and the brush stand a bit higher than the natural height of the strain of peas you have planted.

If brush is not available it is possible to use twine. With the stakes standing about six feet apart and standing about as high as the estimated height of the plants, the twine may be passed around them and secured, in such a way as to form an enclosing fence with its strands about three inches apart. Wire netting may also be used in the same manner.

In the absence of brush the plants, afforded little root shade are likely to refuse to climb well until the weeds in the inside of the enclosure have attained considerable growth and then to use them for support rather than the twine.

In this respect, it is a good thing to remember that climbing peas have the fine ability of being suitable for a rough fence covering. They may be used to cover a border fence if a little additional support is provided. In this way they may be used to produce an excellent crop without infringing on the area of the garden proper.

Never worry about the plants forming their pods too deep in the interior of the brush used for their support. This will not occur. All flowers, and therefore all pods, will develop near enough to the surface to be easily available.

Bush Peas

But you might, like many very successful Victory gardeners, prefer the dwarf or bush types of garden peas. They have much to recommend them. They have recently been greatly improved and their cultivation has much to recommend them.

You might select Blue Bantam (which grows less than 18 inches tall and matures in 64 days) or Radio (58 days to maturity) among many others.

Dwarf-bush pea-plants have a surprising quality. They are so stunted. They have all they can do to keep the tips of the loads of pods which they produce from reaching the ground.

The seed of the bush types should be planted about the same as that of the more familiar climbing types. They demand the same rich soil, the same combination of compost humus and limestone.

If you plant bush peas of the dwarf type, one of your pleasantest surprises will be to find, one cool and quiet morning, that the tiny green bushes are loaded with dark green pods, four or five inches long, each containing seven to nine sweet, bluish-green peas of the finest flavor.

The plants themselves have a coarse, dark green foliage especially resistant to attack from insects.

Wild peas are seldom attacked by insects sufficiently to prevent them from producing the seed necessary for the continued existence of their race. You might remember this.

Wild plants grow under conditions peculiarly suitable for their growth. If you come anywhere near reproducing the conditions necessary for the happy existence of any member of the Legume family, your plants will be vigorous and you will be successful.

XUM

If you root your plants in natural compost humus you might almost ignore insect pests, and if the drainage and other conditions are anything like those needed by the plant you can practically ignore plant disease.

Old time gardeners who succeeded long before the introduction of artificial fertilizers liked to grow garden peas in deep mellow soil. They believed that thirty inches of good humus which had been built up by that added from the compost heap, was not too much. Old gardeners realized the value of good humus.

Edible-Podded Peas

Garden peas have been associated with mankind since long before recorded history. Strangely enough peas were used, almost exclusively, in the dried state until quite recent times.

It remained for modern man to develop the dwarf bush type from the vine type, and to appreciate the seed of the unripe garden pea.

More recently he has developed the edible-podded pea. When you think of the immense loss which occurs because only the seed of the pea plant customarily is used, you will realize the attraction offered by a plant which produced not only an edible seed but an edible seed pod.

You owe it to yourself to try out a few rows of the edible-podded varieties. They have been in common use throughout many parts of the world for a long time. They are no novelty.

The edible-podded varieties are planted and demand the same conditions as other peas.

They are picked before they have become fully developed much as snap beans. Every bit of the material gathered during the picking is of value to the family of the Victory gardener.

When you consider the waste of the pods of ordinary peas, so far as their culinary value is concerned, you will understand the value of edible-podded peas.

In the dwarf-bush types of the edible-podded peas you might select the Little Dwarf Gray Sugar (65 days to maturity). This little plant is particularly prolific and a heavy bearer. It produces pods with a sweet and tender flavor almost all of which reach a length of about three inches.

Edible podded peas in general produce pods which possess the tenderness and fleshy quality of the best, fresh picked peas. The pods should be picked as soon as they have formed and cooked the same as with snap beans.

Giant Butter (80 days to maturity) a round podded strain, has all the fleshy qualities and tenderness of the best snap beans. The stringless pods develop up to seven inches long and are particularly stringless.

Like Giant Butter, Mammoth Melting Sugar grows five feet tall and produces a valuable crop.

Generally the edible-podded peas produce seed pods without fiber when not fully developed. But if the plants produce pods faster than you find it convenient to pick them the seed peas may be used the same as with ordinary garden peas, and the vines have equal value when added to the compost heap.

With all your enthusiasm in planting peas, edible-podded, and edible-seeded, you might have remembered to plant—perhaps purely by accident—somewhere near the ends of the rows of the bush peas, a few seeds of the flowering peas to produce a bit of color.

If you have done this, you must not be surprised to find the Victory gardener's wife greatly appreciating the Scarlet and Salmon-Orange, the Blue and Lavender of the resulting flowers whilst almost ignoring the humble blossoms of the edible pea. Nevertheless, she will collect and thank you for the exquisite and almost edible blossoms of the flowering types of peas.

Ancient man grew the pea plant, stored its dried seed for his sustenance in time of dire need. Modern man devised the quick-freeze and developed the fresh seed of the garden pea.

To you, the Victory gardener, it is given with all its values to use during a period of necessity. It is for you to grow and enjoy and use.

Mulching Garden Crops With Corn Cobs

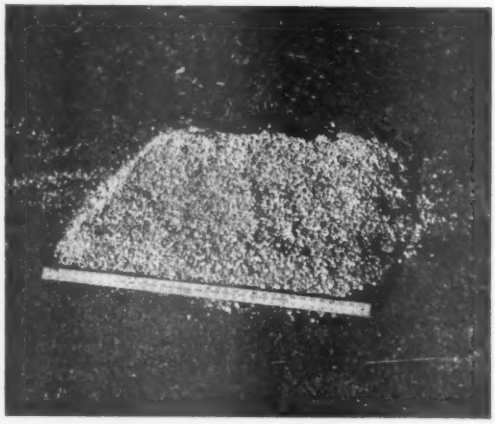
A plan which gives great promise of saving time and labor in many sections.

From HORTICULTURE MAGAZINE (Boston, Mass.)

SUMMER mulching of gardens, I am reliably informed, is a common practice in England. Sporadic attempts have been made to popularize it in this country by using sterilized domestic or imported peat, and a special paper fabricated for the purpose, the idea being to conserve soil moisture, to maintain a uniform soil temperature, and to control weeds. The paper mulch has proved difficult to handle, except when laid between rows or in the rows of the vegetable garden, and manifestly has no place in the perennial border, being unsightly and not at all suited to this purpose.

Peat or peat moss has many good points and is widely used but when applied heavily enough to discourage weeds, it is too expensive for use in a garden of generous proportions. Home-made mulches, including lawn clippings, old manure, and decomposed leaves are better than nothing but they have little effect on weed seed germination and growth.

When my son, who is a farmer, suggested crushed corn cobs as a garden mulch, I remembered an experience on an Iowa farm long ago, when corn cobs often were burned in great quantities to dispose of them. Not infrequently, however, the hog lot, heavily littered with cobs, was plowed for a vegetable garden and especially for watermelons, being held in high esteem for this purpose.



Crushed cobs piled three feet square and two and one-half inches deep.

With this fact in mind I obtained a ton of crushed corn cobs from a local grist mill at a cost of $7.00. Each of 20 large sacks contained a hundred pounds, so that as a beginning I had in bulk at least something quite tangible for my money.

By actual measurement it was found that 100 pounds of the crushed cobs would cover 40 square feet to a depth of two inches, which is heavier than an ordinary garden mulch need be. The product is clean and does not soil hands or clothing and is entirely free from weed seeds. It is a soft light yellow or tan in color, very slightly acid in reaction and has a characteristic semi-fragrant odor.

Crushed corn cobs have been utilized locally to some extent

as a litter for poultry houses and from considerable experience I unhesitatingly state that for this purpose they are vastly superior to other products; they absorb and retain moisture as well as or better than any of the well known peats.

The whole cobs have long been used to retain moisture around hills of melons or cucumbers by being well soaked and then plunged vertically into the soil, forming a circle around the recently planted seeds.

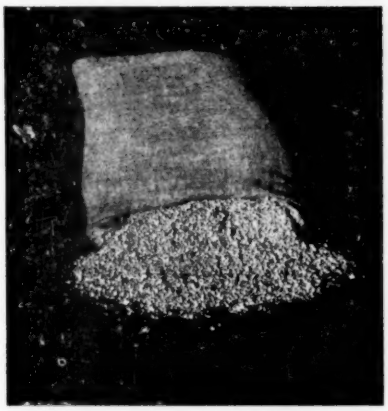
Around perennials and shrubbery the fresh corn cob mulch furnishes a pleasing contrast in color, but this is transient, for by the end of the season the mulch has changed to an earth brown.

Early in May, 1941, I applied such a mulch to a depth of about two inches over a garden where peonies, anemones, aquilegias, roses, oriental poppies, Louisiana and Japanese irises and some other perennials as well as a few shrubs were well established. The soil was clay enriched with rotted manure and decomposed compost.

This garden like all other cultivated spots where I have my home requires much artificial watering during the mid-Summer season if good growing conditions are to be maintained in an average year.

In mid-April of 1942 I planted half a pack of yellow onion sets and covered them heavily with the mulch. These proved to be the mildest flavored and most succulent Spring onions I have ever had. There were perhaps a dozen weeds in this patch, and no cultivation of any kind was given.

In the perennial garden a few weeds appear, but except for removing the mulch from the crowns of the oriental poppies and peonies the ground was not disturbed. The soil under the mulch retained its moisture, and weeds were so thoroughly controlled as to present no problem whatsoever. This was in contrast to previous years, when weeds flourished to such an extent that it was a question many times whether the flowers were really worth the effort made to grow them.



Crushed corn cobs as delivered in sacks.

The appearance of the mulch justifies the belief that it will be of considerable value for a third Summer.

Several beds of azaleas of the hardy and semi-hardy varieties have been mulched exclusively with crushed corn cobs, to which has been added fertilizers appropriate for them. It will require more than two seasons to determine whether the mulch is entirely satisfactory for these subjects; however, they are in excellent condition at this time.

Let me sum up. Crushed corn cobs are much less expensive than any commercial mulching material with which I am familiar, and if permitted to remain on the ground as a mulch, one liberal covering will last at least two years. Assuming an advance in price due to present conditions, so that the cost will be twice what I have paid, the saving in labor for weeding and cultivation alone will more than justify the investment.

The product is available wherever corn is grown and every grist mill has the facilities for grinding the cobs.

The pH value at the end of the second Summer with specimens for analysis taken from three different gardens was pH5.

Probably crushed corn cobs have been utilized for mulching purposes heretofore but I have not been able to find any literature on the subject nor have I encountered any one among a good many amateur and professional horticulturists who has had any information on the subject.

—E. A. Merritt, M.D.

Compost and the Orchard

By Helen L. Waite

OFFENSIVE rather than defensive strategy usually wins a war—perhaps the same tactics may be carried over to successful orcharding.

"How can we care for an orchard without using poison sprays?", asks a correspondent in the February issue of ORGANIC GARDENING.

One possible answer is—Don't wait for the blight and insects to attack the tree and then try to defend it with spray and commercial fertilizer. Instead start an offensive campaign by using a natural composting feeding to develop a healthy resistant tree that can fight its own battles.

A small chance experiment showed us how successfully this might be done.

In 1933 we bought Ertoba Farm in Pennsylvania, 76 acres of basically good but sadly abused land. On the place was the disheartening remnant of what had once been a flourishing home orchard of approximately 50 trees, peach, apple, pear, plum and cherry. Unpruned and badly nourished for years, the trees were spindly in growth and at the time we took possession (July) covered with twisted wormy fruit and festooned with ghostlike webs of tent caterpillars. Not very promising.

The first year we left the orchard alone as uneconomical to handle. In fact, careful cost accounting will show the average home orchard pays small dividends on the time, labor, equipment and material involved under present day *commercial practices.* Spraying and fertilizing are expensive and time consuming and the resultant fruit is usually inferior in size and appearance to the best market product; certainly inferior in taste and nutriment to the wild fruit.

We left our orchard, therefore, for later consideration after some other projects were underway, notably the starting of a poultry flock.

To house this flock we moved a portable brooder house down under one of the pear trees, a barren Seckel pear.

The flock consisted of approximately 200 to 250 chicks and clean chopped straw was used for their litter. It was our practice to use a relatively shallow litter and to change more frequently than is customary. We disposed of the straw and caught droppings by brushing them out through a trap at the back into a pit beneath the house which was protected from the chicks on range by a heavy screening around the foundation.

At the end of the season the brooder house was moved to a new location and the matter forgotten except that the straw and dropping pile which had been decomposing in the shallow pit under the house appeared somewhat unsightly when exposed. It was turned a number of times in the months that followed without appreciably decreasing its bulk and the next year in the interest of neatness this rather crude compost heap was worked in around the base of the pear tree to a radius of approximately 6 feet.

The following spring the pear tree was a bouquet of bloom in contrast to the poor showing of its neighbors. The tree set fruit early, showed little or no cast fruit (the ground around the other trees was covered early by drops) and bore a satisfactory crop of 5 bushels of well formed russet pears in the fall.

So unwilling are we to learn or to correlate events logically that we considered this bounty was due to the fact that it was the "good" or bearing year of this particular tree. But when this crop was repeated the second and then the third and fourth season while trees a few feet away on every side continued to have barren years indefinitely some idea of the

value of organic composting and its use in orcharding began to penetrate.

Sufficient to say this yield continued with some seasonal variation and in the fall of 1942 "THE PEAR TREE" bore its 7th consecutive crop of 6½ bushels of clean healthy satin-firm fruit that can be eaten full of sun directly from the tree without first being washed, brushed or de-poisoned.

The general physical appearance of this tree is also worthy of note. In an orchard of thin rather pale trees afflicted with blight, mildew and caterpillars this pear is heavily leafed with a dark rich foliage and the bark is clean and apparently free of fungus.

The results with one tree are far from conclusive of course. But they do offer a point of departure for a larger study. This year it is our plan to work every second orchard tree with a compost of cured lawn grass clippings to which has been added a small portion of 4-year-old chicken manure, hard wood ashes, and lime. Results later.

But of this I am convinced—that sprays and commercial feedings (apart from their known danger to health) are perhaps efficacious as a defensive practice against infection already present on weak overforced trees—but why not try the simpler offensive strategy of feeding trees to strength so they can repel blight and pest naturally for themselves?

How Solar Energy is Wasted

By Sir Albert Howard, C.I.E.

PERHAPS the most important factor in crop production is the energy of sunlight for the interception of which the green leaf is designed. As this energy costs us nothing and is not marketed by high pressure salesmanship, based on chemical analyses and the "fastidious approval of the higher mathematics," its full utilization on our gardens and farms is often neglected. Not so, however, in the operations of Nature—the supreme husbandman. In the forest, for example, arrangements are always made to trap most of the sunlight by the foliage of the trees and undergrowth, and what is left over is used by a marvellous mixed carpet of Cryptogams — Ferns, Mosses, Liverworts, Lichens, and Algae. None of the vital solar energy is ever wasted: every scrap is utilized wherever and whenever the chlorophyll corpuscle is able to function. In consequence, it is rare to see any bare ground on the floor of the forest.

Very different is the story in the average garden, particularly where monoculture is the rule. The ambition of most gardeners is to keep their land spick and span like a carefully-tended drawing-room into which the rude interloper never enters. A great effort is made to ensure for the current crop a place in the sun by itself, where it can enjoy the pampered existence of the monopolist.

But already some of the pioneers in gardening are breaking away from this drawing-room tradition and following the lead of the plantation industries and a few of the live wires in the raising of such crops as Hops and fruits, where the methods of Mother Earth have, after all, been found to be advantageous. In crops like Rubber and Tea, the fetish of clean weeding has given place to controlled weeding. Under Hops, fruits, bulbs and vegetables, weeds are in a few cases allowed free play after the grand period of growth is over and the phase of ripening begins. All surface cultivation stops during the last week of July or the beginning of August, and soon the land is covered with a dense carpet of weeds. By this means the following results are achieved:—

(1) The nitrates and other soluble salts left in the soil by the crop are absorbed by the weeds and immobilized in the form of easily decomposed organic matter. There is there-

XUM

fore no loss of food materials by leaching, and at the same time the energy of sunlight is fully utilized.

(2) The drying of the surface soil and the removal of food materials by the weeds helps the crop to ripen, a fact of considerable importance in plants like the Onion and Potato.

(3) The weeds, when dug into the fertile garden soil before the end of the year, are readily converted by the soil organisms into humus which becomes mineralized in time for the next crop in the spring.

I have just seen a successful example of this use of weeds in the large vegetable garden at Levens Hall in South Westmorland which, under the able direction of the head gardener, Mr. F. C. King, has for many years established for itself a high reputation in local gardening circles. Mr. King tells me that general weeding is always stopped by the end of July, and that in crops like Potatoes, Celery and Leeks, no weeding at all is attempted after the final earthing-up. They not only perform the duties of a self-sown, green-manuring catch crop, but are also of use as indicators of soil fertility. Mr. King judges the condition of his various plots by the way weeds, like Groundsel, flourish! He regards them affectionately as his unpaid soil analysts. The better they grow the more he is pleased. Indeed, he goes so far as to state that there is no better method of judging a vegetable garden than by the condition of the weeds in October.

Levens Hall has recently taken up the Indore process of composting, and soon expects to pass the hundred-ton a year mark for the four acres now under vegetables. Much more will be made when the supply of labor becomes less restricted. Two interesting results were obtained during 1942: (1) The effect of Indore compost on seedlings and transplants was found to be about the same as that obtained by soil sterilization; and (2) the labor needed in the systematic conversion of the mixed wastes into humus proved to be somewhat less than that previously needed in removing the crop residues to a large dump in a near-by wood.

If the use of weeds in the late summer and early autumn for green-manuring spreads in this country, at least two further steps are indicated. The first relates to the best way of using the stocks of compost often available in the autumn; the second to the judging of gardens and allotments.

Correspondents are always asking me how to use to the best advantage the Indore compost they have made. If some of this is spread on the weeds before they are turned in during late autumn, it will help the soil to prepare the humus needed for the next year's crop.

In the judging of gardens and allotments it is usual for the judges to visit the competitors once only, some time in July, when the gardens are at their best. As the competition becomes keener, it might be an advantage to pay another visit in October, and to allow points for the weeds and their utilization as green manure!

Speeding Indore Compost by the Petty Method

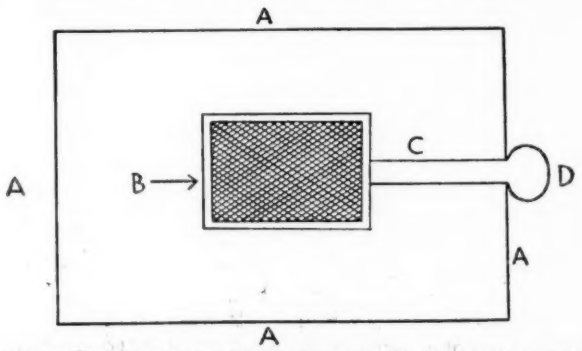
Reprinted from the COMPOST CLUB MAGAZINE (Auckland, New Zealand).

WHAT seems to be an improvement on the Howard method of making a compost heap has been developed by Mr. E. T. Petty, of New Plymouth. Mr. Petty is an enthusiastic member of the club. He has been the prime mover in the formation of a branch Compost Club there and in spreading the gospel of humus fertilization through the Taranki Province.

Mr. Petty has devised an effective method of ventilating the heap, which results in considerably shortening the time taken in reducing the material

to humus. His idea is quite simple, like most good ideas. First decide the size your heap is to be and mark out the site accordingly. In the centre, dig an oblong hole about 9 inches deep. Make a small trench at one end of this hole leading from it to outside the heap. Line the sides of the trench with boards and lay another board along the top like a lid, to prevent compost or earth from falling in. Cover the hole with a lid of ½in. chicken netting fastened to a rough wooden frame, or with an old wire door mat, or anything else which will let the air through but prevent the compost material falling into the hole. Build a box round the site of the heap and put your material into it in layers in accordance with the Howard method. Air passes down the covered trench and into the hole under the heap and thereby maintains a steady flow into the compost material. The end of the covered trench need project only two or three inches outside the heap. (The earth will have to be dug away from it to admit the air freely.) Pipes may be laid in the trench in place of boards if available. The whole idea is to make an airspace under the heap and a channel to lead the air into the airspace. If the heap gets too hot, the temperature may be controlled by closing and opening the end of the trench or pipe as required.

The Petty Method. Simple Device Anyone Can Make



PLAN OF SITE FOR COMPOST HEAP BY THE PETTY PROCESS.

A: Boundary of site. Boxing, bricks or cement built at "A".
B: Wire-netting cover to air pit.
C: Covered trench or pipes from air pit to outside heap.
D: Hole to leave ends of trench or pipe open.

Temperatures higher than 150° F. should be avoided for if the material gets too hot, some of its value may be destroyed. In dry weather, particular care must be taken to see that the heap does not get too dry. In wet weather, the air chamber and trench form an efficient drain.

In "An Agricultural Testament," Sir Albert Howard describes a somewhat similar idea in a description of the making of compost from sisal fibre. In this case the heaps were built on a platform of poles laid on the ground, the poles covering the whole site of the heap. Mr. Petty's method seems better in that more contact with the ground is retained.

Dr. Pfeiffer recommends bundles of sticks laid end to end down the length of the site with similar fascines or else perforated pipes standing upright in the heap, in the case of large heaps.

Chickens and Earthworms

Referring to your last issue of Organic Gardening; it might interest you that we have been trying to raise worms underneath the hen roosts, but inasmuch as our chicken house has a cement floor, we solved this problem by raising the pit above ground and used brick masonry about 3 ft. high and probably 6 ft. in depth. This was covered with wire of a fine mesh except about 1 ft. which had a large wire mesh to enable the birds to get worms that came to the surface. Inasmuch as this experiment was only started late last fall, we are not yet in a position to tell you how it worked out.—Minkdale Farms—A. F. A. Konig, Newtown, Conn.

Spring Notes on Growing Vegetables

By Roger W. Smith

WITH March comes the time when you, the Victory Gardener, hold your hat on while you look your garden over. You review your notes with difficulty and eagerness. You consider early vegetables first.

The dwarf-bush type of peas (Little Marvel only 18 inches tall) is amazingly productive for its size. But the tall growing types, the Alderman and the Telephone Varieties, (four and a half to six feet tall) are the ones that really produce.

The material to support these climbers should be in place as soon as the plants appear so that the shadows cast by it will attract the seeking vines. One row of brush can be made to serve two rows of peas if the rows are about twenty inches apart.

Get the seed peas into ground which has been prepared and properly supplemented with compost humus, just as early as possible. The seeds should be planted about an inch deep and three inches apart at the bottom of a trench three inches deep. As the seedlings grow the trench should be filled by breaking down its sides, so that when the plants are large the roots will be buried deep and cool.

Plan to try out one of the edible podded varieties that cook up pods and all like snap beans.

If your garden is unfenced and frequented by rabbits by all means plant the tall growing types of peas. These form their pods high up out of reach of the rabbits. Also many white strings stretched around the rows will tend to discourage rabbits while the pea plants are still young.

Many gardeners apply a light dusting of salt to asparagus beds in the early spring to keep down surface weeds because of the difficulty sometimes encountered in cultivating the bed without destroying the new asparagus shoots. If lightly applied, the damaging effect of the salt fails to reach to the deep growing asparagus roots.

A handful of red radishes. The spring vegetables are here. You will find that radishes require plenty of moisture rich in plant food to form good, crisp roots. To have full flavor and to be free from "wooliness" they are best grown in ground made rich by the addition of mature compost humus.

In planning a pleasant Victory garden it is worth your while to remember to add a touch of color—a few Golden Glow nasturtiums, perhaps, planted to fill the gap left by the removing of a row of radishes.

Nasturtium seeds make a fine, old-fashioned flavoring for salads and the like.

Or plant a few groups of the colorful, very large Russian sunflowers.

A hill of cucumbers that will supply most of the needs of the average family is easy to grow if you plan for it.

Dig a circular hole about four feet in diameter and three feet deep. In this hole place a butter tub or an old barrel which has had many holes punched in its sides. Fill the tub about two thirds full of compost humus and fill the area surrounding the tub with the same material, properly firmed.

Enough cucumber seed should be planted around the tub to provide for eight or ten strong plants after thinning. The tub should be filled with water. Water the plants often by filling the tub and allowing the water to seep through the holes.

No Victory garden is complete without a few rows of sweet corn. Several short rows aid in proper pollination. A good way to secure a steady supply of sweet corn over a

long period is to plant one row each week.

Or you can select an early type like Golden Bantam and a late type like Country Gentleman to secure the spread. Plant the seed generously and thin to fourteen inches apart in the row.

If you prefer to have most of your corn ripen at the same time, try some of the newer sweet-corn hybrids, such as Spancross, Marcross, and the like.

If your garden is in an area where the soil is very poor, plan to arrange for a few outside compost heaps. Many owners of vacant lands near highways are glad to have the tall weeds, brush, grass, etc., kept under control. You will generally find them willing to have you do this for them and if you compost the scythed material on the spot, that is usually all right too. Later on, you can have the mature humus hauled to your garden.

Peas and carrots can be planted very early. Don't rush corn, cucumbers, beans and other tender plants. Let the ground warm up a bit. Spend the time in getting the garden into good condition, the bean-poles and tomato-stakes ready. Plants seeded a little late have an uncanny way of catching up on those planted earlier.

Beets are sometimes temperamental in growth whereas carrots generally succeed easily. You will get better results with beets if you soak the seed in compost water (that is water which has been filtered through a quantity of compost humus) for twenty four hours before planting it. Beet seed as sold is really a small, dried fruit containing several seeds.

Carrot seed is easier to handle and plant if it is mixed with dry sand and the mixture planted complete. Both carrots and beets have to be thinned no matter how careful you are not to plant the seed too thickly. If this is done when the roots are about the size of a man's thumb, the material pulled is very desirable for kitchen use.

Carrots will tolerate being crowded as close as fifteen to a foot of row but beets do best if thinned to stand about three inches apart.

Pod and lima beans offer much variety. No garden vegetable produces more edible material to a foot of row than pod-pole beans. Bush types are convenient, but the climbing varieties outyield the bush types and require less space.

If you plant pole beans, one packet of good seed should be enough for fifteen poles.

Get the poles into position when you plant the seed or before. The poles should be rough-barked saplings properly trimmed. The twining vines can secure a much better purchase on a rough surface.

A good way to set the poles is to make a hole at the spot where the pole is to stand by driving a stake about three feet into the ground using a large hammer or the back of an axe. Then remove the stake and force the end of the pole into the hole and firm properly.

If possible plant pole beans at the north end of the garden to avoid shading the shorter growing vegetables. If your garden space is limited you can plant pole beans, both pod and limas, to cover a fence.

It is best not to plant seed beans too deeply. An inch deep in good soil is enough. Plant the seed with the eye pointing downward for best results. Remember that in sprouting the growth from the eye has to force the expanded seed up through the surface of the ground. A surface which tends to cake can greatly hinder this early growth but even a slight addition of compost humus can prevent this caking.

Scarlet-runner beans are often planted for the colorful flowers they bear as much as for their abundance of fine flavored pod beans. A touch of color can also be added by planting a few morning glories at the ends of the rows.

Lima beans succeed best in localities having plenty of sunshine. Both pod and lima beans do best in warm loam having a maximum amount of rich humus. Even a small amount of compost humus dug into the hills before planting the seed goes a long way to producing strong, insect resistant plants.

If you avoid working around bean plants when they are wet you will avoid the possibility of bringing plant disease to them from surrounding infested weeds.

Keep all beans picked just as soon as they are fit. You will find that one or two mature beans ripening on a vine can do much to prevent the formation of others on that plant.

Surprise yourself and try out a row or two of Lima-peas, sometimes called Windsor or Broad Beans. This type has been cultivated since time immemorial. It should be planted

like dwarf-bush peas and at the same time. It is an erect growing plant two to four feet tall. It comes into bearing about the same time as peas but bears a bean much like a large lima.

Or try wax beans.

Take advantage of the fact that you are growing vegetables for home use. When you grow your own you can select delicious types that are not developed for their ability to withstand shipment and delay in consumption. If you grow them with the aid of well made compost humus you can be sure that they contain their full quota of the necessary vitamins and have developed their proper flavor.

For example, in planting tomatoes select types like Ponderosa, or if you prefer a scarlet-red tomato, Beefsteak. Set the plants three feet apart in four foot rows. Stake them properly and prune them to single stems. This makes for easier cultivation and larger, fine flavored tomatoes, even though you do find that the pruning gets a bit out of hand before the season is over.

Get tomatoes off to a good start by planting them properly. Dig a circular hole about three feet in diameter and fill this hole with mature compost humus. Set the plant carefully.

In watering tomato plants you will find that it pays to use a solution made by pouring ordinary water into a container holding a quantity of compost humus. Let the mixture settle, then draw off the liquid.

If there is an untilled area at one side of your garden, plant squash vines and pumpkins near that edge and train the vines to spread away from the garden. With their roots well established in good humus the vines will clamber over tall weeds and brush and bear their fruits many feet from the garden proper.

If your Victory garden is without a fence and a neighbor's dog comes around, don't get unduly alarmed. The damage he might do is little compared to the destruction that might have been wrought by the rabbits he chases away. His companionship is worth something anyway.

A few rows of chard will assure you of plenty of summer greens. Don't seed too thickly. Like beet seed chard seeds, as sold, are clusters each containing several seeds. Soak in compost water as with beet seed.

For best results thin the plants to six inches apart. Rapid growth favors the formation of tender leaf stems of finer flavor, and this rapid growth can best be promoted by the use of compost humus. Water the young plants with compost-water. Since only the outer leaves are picked the plants produce continuously during the summer.

Planted in July or August, a couple of rows of kale will provide you with the necessary fall and winter greens. Kale is easy to grow. It is very hardy and for this reason is dependable long after frost has cut down the chard.

Follow directions on all seed packages accurately. Those directions were put there for your benefit and will do much to help you succeed. They are the result of much experiment. Carelessness when planting seed, especially as to the depth of planting, is very wasteful.

Mark the end of the rows clearly by stake so you won't get mixed up. A few radish seed planted with the slower growing seeds will do much to show up the rows for early cultivation.

If things don't turn out quite as well as you had hoped, try not to be impatient. Use your head to save your back. For example, plant everything in straight rows and run a hoe or cultivator between the rows as soon as the ground is workable after each rainy spell.

Take a walk around your garden once in a while just loafing and see how you can notice —things that will save you much labor later on. Observe the location of your garden. If it was planted last season, which vegetables did best in it?

Give established varieties and those intended for home ues the preference. They will give you better and more certain results.

A good Victory garden almost always has a small seasonal surplus, things that cannot be conveniently used in the house, greens in the spring, snap beans late in summer, miscellaneous roots in the fall. Many Victory gardeners give these surpluses to small children who visit them. The families of these children make good use of them. Just the giving of them makes the gardener feel good. But above all if properly done, this promotes friendliness and does much to teach the children not to pilfer or do unnecessary damage.

Don't be discouraged if your garden budget is quite limited

so long as you have the place. Remember that men had fine gardens and raised fine crops long before the conveniences of modern life were known. They had to depend upon their own home-grown seed, their own home-made tools. These men produced abundant crops for their family use long before the invention of chemical sprays and chemical fertilizers.

The Japanese Beetle Ignores A Bio-dynamic Garden

SOONER or later the question: "will the mere supplying to the plants of proper nutrition be sufficient for them to keep insect pests away?"—must be answered. It is a question that will not down in spite of the frowns of so-called scientists. Mother Nature protected her vegetation successfully before the modern chemists were born and there is no reason why she should not do so again. There may be a whole lot in the theory that chemical fertilizers have so unbalanced the soil that the plants grown upon that soil are so one-sided as to be so unhealthy—in spite of their beautiful appearance that they cannot protect themselves from insect pests. Anyway, the situation is one worth the closest study and evidence is flowing in that "properly nourished plants, can and do, ward off insect pests."

The following pictures, were taken in August 1942, on the same day.

Mr. Emerson King of Chicago, Illinois, sent in the photographs with this comment:

"While at the School of Living in Suffern, New York, I came across an interesting demonstration of the value of organic farming. The School of Living has been using the Bio-Dynamic Method for only two years. The nearest neighbor, whose garden is within 100 feet of the School's garden, raises chickens and has for about five years fertilized her garden with chicken manure and *super-phosphate*. Both gardens had bean patches raised from the same seed. Neither patch had been sprayed or dusted with poison when I took the two pictures enclosed: August 1, 1942. The beans grown with chicken manure and *super phosphate* were completely destroyed by Japanese beetles while the beans in the School garden were completely ignored."

Below—Beans which received only organic fertilizer.

Above—Beans which received ordinary commercial fertilizer

Science Makes the Worm Turn

(This article copyrighted by THE AMERICAN WEEKLY issue of September 27, 1942, and reprinted by special permission. Further publication prohibited).

INSTEAD of being the farmer's worst enemy, the worm has miraculously enough, become the farmer's friend—thanks to the work of Dr. George Sheffield Oliver, the famous California scientist, who has hit upon a method of literally changing the "character" of the pests from bad to good.

Fantastic as this worm-turning sounds, Dr. Oliver has produced a new type by cross-breeding the common orchard worm and the manure worm. This new hybrid helps the farmer cultivate the soil. So good is its work that farmers are now raising them, not killing them.

Orchard and field worms cost American farmers millions of dollars annually and, until that species is exterminated, they still will. The new members of the worm kingdom are expected to replace the "bad boys" over the years.

Dr. Oliver hit on his idea of cross-breeding after conducting a lengthy study of worm life and habits. His new hybrids—called "solution worms"—aid soil cultivation by predigesting the dirt for the crops. They dissolve the soil and thus make it soluble in the water that carries food to the plant roots.

The fact that the creatures don't roam but stay in one small area greatly enhances their value as soil-cultivators. These "soilution worms" do not like extremely hot or cold weather — consequently twice a year they go deep into the ground. When they return to the surface they bring back with them valuable chemicals.

The worms themselves have a very high nitrogen content, and when they die this is added to the top soil. Through their underground activities, the soil is cultivated to a depth that no plow could reach, and is aerated so that it is capable of holding more moisture. All this does much to increase the crop yield.

Farmers can propagate the new worms in boxes filled with a special composition of alfalfa leaves, peat moss and barn manure and kept in a basement room to insure proper temperature. Then in the Spring the worms are distributed to the desired locations simply by adding 200 of them to a pile of compost.

To the Rescue of the Soil

THE Compost Club believes that much human ill-health and many plant diseases are due to the unhealthy state of the soil. Modern methods of cultivation have robbed the soil of humus, the living fertilizer which Nature uses as a soil-food. The place of natural manures which supply humus, has been taken by synthetic water soluble chemicals which contain no life and so cannot give it. Following Sir Albert Howard, Dr.

Rudolph Steiner and other pioneers the Club advocates the replacement of these "artificials" by humic compost made from animal and vegetable wastes.

New Zealand has been farmed for less than a hundred years. At first our soil showed amazing productivity, and our people remarkable stature.

Now, according to official reports we have hundreds of thousands of acres of abandoned lands. Our orchards and gardens are scourged by insect pests and fungus diseases, previously unknown. Growing and mysterious stock diseases are a nightmare to our farmers. Sterility is common among our herds and less uncommon than it should be among our people. Medical examinations in our schools and for our army reveal grave and growing ill-health.

In China on the other hand the same land has been farmed for 40 centuries and in spite of over-population and food shortages the people show remarkable vitality, toughness and fertility.

Improvements in our choice of foods are not a sufficient remedy for national ill-health. Nutritionists are often baffled by vitamin deficiencies in the foods themselves. How can we expect vitamins, vitality, life, from foods grown with lifeless chemicals in defiance of Nature's laws?—*Compost Club Magazine* (New Zealand).

Our Daily Bread

By Mildred Jensen Loomis

WHITE bread, in oiled paper, varies from a comparatively useless article to a serious menace to health. Most of us know something of its deficiency, but not many know the worst. Yet bread *may* be a source of health to body and spirit of such vitality as to become a sacrament. Only a very few people in our modern day achieve bread like this. It is a result of much searching into meanings surrounding soil, seed and nutrition, and a radical *new* use of science.

There was a day when the peasant scattered seed on good soil which he loved and tended by hand. The mature grain he ground between stones and made of it flour which he fashioned into bread in his own house. In that day of whole grains, bread helped develop muscles of steel. In that day of simple procedure, a loaf of bread was a creative act and a satisfaction to the soul of the maker. In that day it was the Staff of Life.

But a strange notion developed that working in the soil was crude and that dark bread was vulgar. A new kind of god, the Scientist, made a great discovery. He had created a mill, a Machine, which separated the parts of the wheat. Now he could discard the dark portions of the grain and that annoying fatty substance, the germ, which spoiled so quickly. He pointed with pride to his beautiful white flour. Best of all, it lasted for months! Now he could sack it and ship it great distances so that every one might avail themselves of this new finding of science.

Everywhere people turned to the daintier white bread. It was so much more refined, a step away from manual labor and the peasant. (There began a separation of art and science. Bread was made according to the standards of "art"—to please the eye and the taste, with little thought of whether it was *good* for his health.) In truth it did keep, for it was embalmed. When the germ had been removed Life had been removed. Mice attack only the end of the grain where Life germinates, leaving the white portion. Nor do weevils touch it. These creatures have more sense than man.

But the new flour grew in popularity. Mills rose higher and higher in the air. Bakeries increased in number and size. Advertisers proclaimed the virtues of white flour. The

Scientist continued his research that more people might have it, but also to increase the profits to the growing bread "industry." He must cut material costs to a minimum and keep it fresh as long as possible.

In order to attain these aims he developed cheap and synthetic practices and ingredients. In the School of Living bulletin on *How to Economize on Bread*, they in turn quoting from various writers on consumer-problems and from bakers' supply company advertisements, we find the following are often part of factory bread: "powdered or frozen eggs (rejected or cheap eggs from China,) powdered milk, bleached flour, yeast substitutes, artificial butter flavors—paraffin-like hydrogenated fats. Gums are added to baking powder to increase the viscosity of the dough and permit less use of flour; lecithin and related chemicals to permit the use of more water—glycerine to give stale bread a fresh appearance, ammonium carbonate to inflate the bread, alum to stiffen the dough and batter".

But factory-production of the "staff of life" necessitates other interference with a natural process. Dr. Ehrenfried Pfeiffer, noted Swiss agriculturist, in a pamphlet, "Does Bread Nourish?" piles up additional indictments against bread industrially.

He points to the fact that the farmer no longer grows wheat for his own or local use, but for sale to a distant mill. Therefore he must specialize; plant acres and acres of one crop, cultivated from necessity by tractors and machines. This, declares Dr. Pfeiffer, is destructive of the life and nature of the soil, as is the extensive use of commercial fertilizer required by mono-culture. The one-crop system precludes a satisfactory crop-rotation to replenish the soil. Chemical fertilizers destroy earth worms, natural source of humus. Humus-bacteria gone, the soil no longer can resist disease. Fungi multiply, and crop seeds must be disinfected before planting. Depleted of normal humus supply, soil becomes inert, failing to hold proper moisture content. Who of us does not know of the serious social results—soil erosion, dust storms, farm tenancy, etc.? But we do not always know that this same deficient soil results in plants and animals deficient in food value.

Further: the great stretches of wheat demand the combine machine. (Americans quote with pride the story the Englishman is reputed to have told his countrymen after first seeing a combine: "The growing grain in the field goes in on one side and comes out biscuits on the other.") But it takes Dr. Pfeiffer to remind us that since a combine can cut and thresh grain in the same operation, the natural interval of maturing in the sun and shock must be forgone. Grain, thus cut, is more likely to heat and become weevily in storage. But "science" can protect us— cyano gas will be forced into the great bins of stored wheat. No matter if residue of such poisons remains in the flour.

Now the grain is ready for the nine-story mill. Here it is we say good-bye to the germ, full of its life-giving vitamins; and to the coats of the kernel, source of minerals and protein. Only the starch is left—but in its natural creamy color. But fastidious moderns, trained by modern science, demand that this residue of naturalness be bleached from it. More laboratory work. Chlorine and sulphuric acids are administered.

Thus, fluffy white flour—which should be the source of life and health to human beings—arrives at the modern bakery for the addition of some or all of the processes and ingredients mentioned before.

What a train of "scientific" processes inflicted on the innocent wheat kernel all because we have been taught to prefer and buy our bread from the store! Specialized one-crop farming, mechanical soil preparation, chemical fertilizer, seed-inoculation, combine-harvesting, expensive distance hauling, cyano-gas preservation in storage, complicated distribution, removal of vital elements in milling, acid bleaching, adulterants in baking, rival and confusing advertising, expensive delivery. A dozen applications of science—and to what end?

Is it that men shall be happier, healthier and better fed? Hardly. For in their continued research the scientist has now come upon the fact that the vitamin is gone and white bread is sterile. And the public knows it too. In January 1941 *Reader's Digest* Dr. Paul DeKruif points to the removal of vitamins from flour as "one of the most costly mistakes in human chronicle."

So what to do? Science has

an answer. In the laboratory, scientists will "manufacture" vitamins and put them in again! This would be f u n n y if it weren't so tragic. In the sedate language of Peter Van Dresser (Feb. 1940 *Free America*) "this is necessary only because of unwise and over-intensive application of earlier scientific discovery. All because we insist on the early Nineteenth Century idea that we must use science to build factories and maintain cities." And men as brilliant as Dr. DeKruif speak of this taking out of vitamins and putting them back again without the suggestion of a smile. And farmers and consumers don't see that they are paying to have them taken out and then paying to put them back in again!

Now it is time to tell our story of wheat, flour and bread at Lane's End Homestead. It will be so simple that many may not see it as significant. But we believe the implications are tremendous for the spiritual, physical and economic health of our nation, should this simple way become a general pattern.

We have a thirty-acre homestead,—a home on a plot of land where a family lives and works, the direct source of the food, clothes and shelter of its members.

Each year we plant a few acres of wheat for our own use. Since coming from city to homestead I no longer wonder that traditional peoples make a rite of seeding. The day we bring out the smooth full grain has an undercurrent of excitement. We handle the seed reverently, for these bits of matter are packed with life. They came from healthy soil and go back to healthy soil. The doping of it with chemicals before planting would be an offense.

The wonder of the seed is equaled by the mystery of the soil itself, full of living organic matter. In a few days the new green life glistens in the sun. The daily watching it, is for us a sort of stretching. To see it head and turn golden makes us quicken again to the completing ritual of harvest. Can anyone call it crude or begrudge the little assistance it takes to start this process of nature's outpouring?

Just a few months and the grain is in the bin, saved for our own flour. (A small surplus will be sold, but we raised it principally for our own use). We grind it as we need it, in a simple electrically-run mill in our kitchen. This is a small hopper with two grinding surfaces and costs $9.00. It is bolted to a plain bench beside a $5.00 motor. Fine whole flour for a week's baking trickles from the mill in fifteen minutes.

The whole cycle from seed to bread takes place on the homestead. We have eliminated the seven-story mill, the costly long process—the solemn nonsense of taking out the living germ and trying to make up for it by putting in manufactured vitamins. We have done away with scores of handling charges. Wheat that we raised at a cost of a cent a pound has become the same amount of flour at practically no increase in cost. In a good food shop in our neighboring city the same quality flour costs ten cents a pound.

The bread is the crowning achievement. Too much work? Surely not—ten minutes of assembling the ingredients and washing the equipment, for the dough is mixed and kneeded by a heavy-duty electric mixer. This writing was interrupted at this very point for the ten-minute o p e r a t i o n. The dough is now set away in a warm oven and the article will be finished ere the time for putting it into pans arrives. Nor is the baking difficult. All the guess work is removed. All we have to do is set the control on the electric oven and in an hour, there it is.

Technology if you like, but of a new sort—to foster the home and home life rather than deplete it. The home becomes the center of production of this basic need, bread, (and many another) when the machine is taken from its mooring in the factory and adapted to the individual family with mobile, electric power. Nor is this going back—it is going forward to economy, simplification, and to creative, independent, healthful living.

And the bread itself—as pretty a sight of woman's art as she might hope to see; a union of art and science. Such bread is beautiful and good—and, it may be the cure for many an ailment in modern life for Dr. Weston A. Price (Nutrition and Physical Degeneration, Dr. Weston A. Price, $5.00. Harper Bros.) maintains that wherever people have a c c e p t e d the "white man's diet," principally white flour and white sugar, there has been rapid and outstanding deterioration; noticeably in the dental arch and facial formation, and invariably accompanied with tissue degeneration, often including the

brain. He maintains that the extensive use of devitalized flour, bread and cereals is the substantial basis for the increase in modern degenerative diseases, cancer, heart trouble, arthritis and the like.

And bread from a complete home-process might well be the cure for ailing spirits too. What has the modern bread-buying homemaker to take the place of the feeling of accomplishment in turning out a good batch of bread—increased if she plants, harvest and mills the grain. Surely the bridge game or even "heading a committee" can't match such basic satisfaction. It may be because modern woman has turned from such elemental productive acts that her sense of usefulness, her neuroses, have grown apace. Maybe the modern woman would find herself in becoming again an economic asset by producing in the home those things essential to her family's health and well being. And no one is more pleased than the modern child, coming home from school, to sniff the aroma of new bread filling the house and be given a big slice of newly browned bread dripping with honey or molasses. Perhaps bread can again be the Staff of Life.

Health from Properly Raised Food

The following letter from Dr. Scharff is reprinted from the NEWS LETTER ON COMPOST (Published in England)

THE SINGAPORE HEALTH DEPARTMENT COOLIES.

Rydal Mount
Potters Bar,
Middlesex
7th September, 1942

YOU have asked me to give you an account of my observations on the health-giving effects of eating freshly grown vegetables grown on soil nourished with compost. The compost to which I refer was made according to the Indore method.

From January, 1940, until January, 1942, I had a unique opportunity, due to war-time needs, of watching the progress of a campaign for growing vegetables and seeing that they were eaten by a labor force of nearly 500 tamil coolies. These men were employed by the Singapore Health Department in various parts of the island of Singapore. As soon as England became involved in war it became possible to allocate an area totalling in all about 40 acres of vegetable allotments on favorable terms to the men engaged on sanitary duties. My laborers were granted these allotments on condition that they prepared compost and used the vegetables and fruit grown therein for themselves and their families only. Sale of the produce was not allowed. Thus it was ensured that these goods were used at home. The local Agricultural Department lent their inspectors and staff to teach the men how best to grow vegetables and demonstrations in cooking and preparation of the foodstuff was organized for each of the labor settlements. Compost making was started on a large scale and during the months previous to the opening of the campaign a supply of over a thousand tons of compost was ready to launch this great experiment.

During the course of the ensuing months, apathy and indifference, on the part of the laborers, gave way to interest and enthusiasm as soon as it became apparent how well plants would grow on soil rendered fertile with compost. A number of vegetable shows were arranged, at which the healthy produce of fertile soil

was exhibited and prizes were awarded. Within six months the accumulated stocks of compost was used up and more active steps were taken to augment the supply as well as to satisfy the growing demands of other enthusiastic gardeners inspired by the achievements of my men.

At the end of the first year it was obvious that the most potent stimulus to this endeavor was the surprising improvement in stamina and health acquired by those taking part in this cultivation. Debility and sickness had been swept away and my men were capable of, and gladly responded to, the heavier work demanded by the increasing stress of war. But for the onslaught by the Japanese which overwhelmed Malaya I should have been able to present a statistical record of the benefit resulting from this widespread effort of vegetable culture on compost such as would astonish the scientific world. The results were all the more dramatic in that I had not expected this achievement.

The numbers taking part in this venture were so large as to preclude any possibility of mistake.

It might be argued that the improvement in stamina and health amongst my employees was due to the good effect of unaccustomed exercise or in the increased amount of vegetables consumed. Neither of these explanations would suffice to explain the health benefit amongst the women, children and dependents of my laborers who shared in this remarkable improvement. Shortly before the tragic disaster which has brought Singapore within the hateful grasp of the Japanese invader it became apparent that the health of men, women and children who had been served consistently with healthy food grown on fertile soil was outstandingly better than it was amongst those similarly placed but not enjoying the benefits of such health yielding produce. An oasis of good health had become established, founded upon a diet of compost-grown food.

This has served me as an inspiration to carry on with this work in whatever part of the world it may now fall to my lot to serve mankind.

Yours sincerely,
J. W. SCHARFF
(Chief Health Officer
—Singapore.)

Earthworm Dept.

Questions submitted and answered by Miss M. B. Leasure, California Earthworm Farms—324 E. Acacia St., Ontario, Calif.

Question: Is any climate suitable?

Answer: Yes.

Question: Is there a special season for breeding?

Answer: No, the domesticated earthworms breed throughout the year, but more rapidly during the spring and summer months.

Question: Are domesticated earthworms valuable in Victory and small home gardens?

Answer: Yes.

Question: Are they as valuable to the growth of deciduous as they are to the growth of citrus trees?

Answer: Yes.

Question: Do earthworms feed on live plant roots?

Answer: No.

Question: Why allow lawn clippings to remain on the surface of the lawn?

Answer: Lawn clippings are an excellent natural food for earthworms, and the increased food supply results in increased earthworm population.

Question: Will the direct sunlight affect the earthworms?

Answer: Yes, direct exposure usually proves fatal in a short time; however, culture beds given partial protection of lath, humus, burlap, etc., can be placed in the open sunlight.

Question: How does a compost pile differ from an earthworm culture bed?

Answer: For the most part, compost piles are placed on the ground with little or no framework. Culture beds, on the other hand, may be placed indoors in cellers, sheds, etc.,

on floors or platforms and usually have sides of wood, brick or stone. Earthworms can be developed easily in compost piles, and of course, may also be raised in open pits, except where they are being raised slowly for commercial purposes.

Question: Can dry as well as fresh leaves, weeds, etc., be used as earthworm food?

Answer: Yes.

Questions submitted and answered by Bernice Warner, Ohio Earthworm Farms, Worthington, Ohio.

Question: What to do for moles that eat Earthworms?

Answer: Watch and catch a mole in its runway by sticking a shovel back of it so that it cannot return and the mole cannot work fast enough to go forward. Kill it there and leave it. As soon as it decays the Earthworms will devour it and all other moles will leave that area.

Question: Why do stepping stones sink?

Answer: Stones do not sink; it is the action of the Earthworms working the soil, making it more porous and spongy.

Question: What is the short term and long term effect on worm population from a practical standpoint on seedlings?

Answer: Short term. To give specific facts we took two apple trees, Baldwin species as much the same as possible, impregnated No. 1 with 300 Earthworms as soon as we could get in the ground after freezing. We g r a f t e d Northern Spy shoots the same day as treated and in two weeks shoots were showing on treated grafts, three weeks for the other. The two t r e a t e d shoots grew 38-44 inches the first year in comparison with 15-18 inches on untreated ones. In the case of two elm trees planted nine years ago, one on top of an incline treated four years ago with 600 Earthworms showed the measurement at the top of the ground to be 34 inches in comparison with 12 inches for the other one; height and foliage in like comparison. We are in the canker worm section where elm trees are stripped not more than 500 yards from the treated tree. The treated tree was attacked and only the young leaves eaten, but most of the leaves were untouched because we have the jump on the life cycle of the canker worm as plenty of food is always available.

Question: Can Earthworms be moved from one place to another without any dirt?

Answer: Some of the dirt that the Earthworms are raised in must accompany the little fellow so that it will survive. Earthworms will s t a r v e to death in a foreign soil unless accompanied with some of the spawn of its natural habitat. But if so transplanted they will acclimate themselves in two weeks. Capsules can be planted anywhere without the native spawn as whereever they hatch that is the natural habitat.

Question: C a n y o u u s e Earthworms in potted plants?

Answer: Yes if the pots are large enough and one is careful not to let the pot get too dry or too hot.

The Earthworm

By Bernice Warner

Ohio Earthworm Farms, Worthington, Ohio.

SOIL, precious soil, a most vital thing to be preserved. Man can live alone without any living thing but he cannot live apart from the earth. It was so made in the beginning. There is something within a man's heart that dies when he turns from the earth.

Fortunate Americans have been very careless only because we were blessed with such abundance that we were not conscious we were taking all from the soil and not giving

back in return. This is where the Earthworm can and does play the headlining part. God created the Earthworm for just this purpose. To prove it to your satisfaction, take two gallon glass wide mouth jars—get the layers of strata from an excavation. (The writer was fortunate enough to get fine gravel for the lower portion, a black, not humus by any means, for the second and clay for the top). In one jar place 50 Earthworms. Measure all water, being careful not to have any water stand in the bottom. Plant a little barley on top and watch. In two weeks' time you will see in the Earthworm jar the first three inches beginning to go together, that is, the three inches beginning to look like good humus dirt. In six weeks, the whole jar takes on a decided change, that of a humus consistency that would nourish any seed. A startling thing is that you cannot use nearly the amount of water in the Earthworm jar, in fact, you may have to drain off the excess. You know, an Earthworm infested soil will absorb a two inch rainfall in fifteen seconds due to its porous consistency and sponge-like structure whereas its neighboring clay takes sometimes as long as two hours to absorb a two inch fall, proving that Earthworm soil is a reservoir for water and of a consistency which will not allow a chance for soil erosion.

Your seeds will sprout sooner because, from the action of Earthworms, the plant food is broken down ready for plant consumption, and it is in abundance.

Now man alone cannot change or rejuvenate soil like that, so why destroy Earthworms—just the reverse, preserve, do everything to build your soil so that Earthworms will make their homes with you.

There can be no question as to results when we realize Nature's plow is constantly at work, going deeper than man can possibly go, never disturbing the tiniest of growing rootlets, letting in more air and water to the roots, and changing all manner of dirt, decaying animal and vegetable matter to organic food and placing it at the roots' very doorstep.

Disease and pests only attack the weaklings and the saying is as true in the vegetable world as in the man world—"We are what we eat," so taking advantage of God's creation, we begin as God began in the beginning; we look to the soil for our beginning.

Reader's Correspondence

January 25, 1943.

Dear Sir.

I would like to know something about Earthworm eggs and what they are like. When I turned the compost heap over that I made this fall, I noticed quite a few whitish eggs a little over one-eighth of an inch long, in one part of the heap.

Geo. R. Bradley,
Calgary, Alberta, Canada.

Answer

We submitted your question to Dr. Ehrenfreid Pfeiffer. His reply is as follows:

"The whitish eggs are larvae from flys. The earthworm "egg" is really not an egg, but an oval, yellow, gelatinous capsule, containing 6 to 12 microscopic earthworms, about 1/8 of an inch in diameter."

●

February 3, 1943.

Gentlemen:

In the Dec. issue of "Organic Gardening" under the heading of "With the Editor" there is the topic, Chicken and Earthworm experiment. In that article you speak of a pit beneath the roost. If you have a concrete floor in your poultry house would it be best to cement the sides and bottom or leave it as dug. Would you please advise.

Arthur F. Frey,
Chester, Ill.

Answer

Our suggestion would be not to disturb your concrete floor. We would suggest that you build in the center of your floor, under the roosts, a 12-inch tall open box which should

extend out under the roosts on all four sides for about 3 feet on each side. Fill this box with about two thousand earthworms. Cover the part of the box that is under the roosts with chicken wire so that the chickens can't get into it. Fill the box with rich earth mixed with compost. If you have no compost use earth as rich as you possibly can secure it.

●

January 29, 1943.

Dear Sir.

Should a compost pile be made in the sun or in the shade? Would it be alright to make compost in a box if you left plenty of cracks around the outside?

How many years will an application of compost help crops on a certain piece of soil? Or will most of it be used up the first year.

Is there some place around where I could get some vegetables tested for their vitamin and mineral content?

Roy Roeschley,
Flanagan, Ill.

Answer

(1) If possible, a compost heap should preferably be in the shade. Where it is in the sun, it might help some to cover it with a straw mulch. It will be satisfactory to make your compost heap in a box around the outside, providing there is breathing space all around. The New Zealand compost box is made on this principle.

(2) It is a known fact that the effects of compost in the ground are felt in some cases for almost twenty years, on a gradually reduced scale, of course. This is an important difference between compost and chemical fertilizers. The use of compost is a solid investment which pays, and pays, and pays.

There are laboratories that would test any food product for its vitamin and mineral content. Mineral tests are cheaper than vitamin tests, the latter are quite expensive. It is our aim to establish a laboratory in connection with ORGANIC GARDENING magazine to specialize in the testing for vitamins and minerals of foods grown according to various methods.

●

February 14, 1943.

Dear Sir.

(1) In the first column of your editorial, the statement is made that vegetables grown with chemical fertilizers do not contain the necessary minerals and vitamins. Is there any evidence to prove this? Have assays been made on vegetables grown with artificial fertilizers showing that they are deficient in these important constituents? Where can I find such assays?

(2) Are vegetables grown by hydroponics deficient in vitamins and minerals? Where can I find figures to prove this?

(3) Stable and barnyard manure are getting scarcer and scarcer. In suburban districts such as this it is all but unprocurable. Must the suburban dweller give up the Indore Method in consequence? Apparently, animal manure is a necessary constituent to the particular type of compost heap described. Is there any substitute? I note that nightsoil is suggested, but you will readily see that this might lead to trouble in built-up sections of the suburbs where most of my readers live. I suppose this animal manure is necessary in order to provide the bacterial action with its consequent heat. Is there any other way in which this can be brought about? Of course, every good gardener has his compost heap, but most of these are slow in decaying and there is no very good control over them.

(4) I do not know whether I have misread the directions, but I gather that sufficient material must be available to make a complete compost heap in one operation. Such conditions do not obtain in most small gardens. The gardener cuts his lawn once a week and wants to make use of his clippings. The organic rubbish from his garden comes along in small instalments and so does the waste from the kitchen. Under such conditions, can the Indore Process be adapted to the needs of the suburban dweller. If so, how?

I enclose check for $4.50 and would ask you to send me a copy of An Agricultural Testament, by Sir Albert Howard.

(Name withheld from publication).

Answer

1. We would suggest that you read thoroughly Sir Albert Howard's book "An Agricultural Testament," (which you have just purchased) as this goes into a great amount of detail on this subject.

2. We are going to establish

a laboratory as soon as it is practicable and one of the things we will try to prove is the deficiencies in vegetables raised by hydroponics. We do not know of any tests, but it is our hunch that it is an absolutely wrong method for producing food.

3. Instead of stable and barnyard manure, you will then use kitchen waste, which includes chicken and fish cuttings and other animal matter. This point is covered in our magazine from time to time. We do not recommend nightsoil. According to Sir Albert Howard, some animal matter must be used in the heap because of the bacterial action.

4. The heap does not have to be made at one time, but if it is made in stages, it should be covered with earth from one stage to the other.

●

March 2, 1943.

Dear Sir.

Is ordinary soot from furnace pipes of any value for use as fertilizer? What is Scotch soot, which is advertised as fertilizer?

F. O. Lewis,
Dayton, Ohio.

Answer

We strongly advise against the use of soot as a fertilizer. It actually is hazardous to growing plants. It was used in the old days before chemical fertilizers were available.

Scotch soot is made by burning peat and is a form of peat ashes although it is not so high in potash as wood ashes. Peat has less fertilizer value than humus.

March 8, 1943.

Gentlemen.

Would you please advise me what to do with orange, lemon and grapefruit skins, could they be used as a fertilizer? Would you advise grinding them and use in a compost pile?

Mary Hovrichak,
Greenwich, Conn.

Answer

Replying to your letter of March 8th, it is not necessary to grind up oranges, lemons or grapefruit skins. If you will place them in the compost heap according to our instructions, they will decay very readily. All that is necessary is that such type of kitchen waste be placed in the heap in layers and treated with lime or wood ashes and kept in a moist condition. The heap should be turned over twice.

●

March 15, 1943.

Dear Sir.

We live at the seaside and can obtain droppings from seagulls on a wooden wharf, also fish cuttings and spoiled fish from the fishermen. Are these materials satisfactory as fertilizer?

L. L. Asprey,
Florida.

Answer

Regarding the droppings of the birds that you mention, they are a very fine form of fertilizer — in fact — higher in plant food content than stable manure. It is a strong material and it is very important that it should be composted, using green residue materials. Fish is even better because the manure or droppings of an animal are merely a by-product, whereas the animal itself contains much more protein material and if properly decayed, is excellent for the land.

●

March 8, 1943.

Dear Sir.

Near us is a large poultry farm and poultry manure is available. Also there are limitless quantities of fallen leaves available in the fall. Will you be good enough to tell me just how to build a compost heap which will consist, in the main, of these two materials. We shall, of course, have some others. I understand that leaves, while not ideal for the purpose, can be used and that the same thing applies to poultry manure.

W. W. Gallagher,
Wellesley Hills, Mass.

Answer

Poultry manure is ideal for composting. It should not be used direct on the land, as it is too strong, but if you follow the instructions contained in our magazine and mix it with plant material and lime, you will have an excellent fertilizer. The enclosed instructions should be followed, using the poultry manure instead of stable manure, but we would suggest, if possible, that you find other material to mix with the leaves because leaves alone are a little stubborn and take a little longer to decay. It is also good to let leaves weather first for a few months or possibly over the winter and form into a leaf mold and then use it in the compost heaps.

March 15, 1943.

Gentlemen.

Can you make any suggestion for tomatoes in the way of increasing production of fruit with a minimum of stalk as I know you must not use manure as that runs to wood, so I am anxious for your suggestion. I do not like chemical fertilizer.

L. G. Rose,
New York City.

Answer

Finished compost cannot be compared to raw manure. If you use a reasonable amount of humus on any vegetable you need not fear the results. With raw manure it is necessary to be extremely careful in some cases.

●

March 20, 1943.

Dear Sir.

Your magazine tells a lot of what to do about making the right kind of compost heap for next year, but can you tell me what would be the best thing to use or buy that will help me this year, that is nearest to organic compost.

D. M. Benford,
Mt. Vernon, N. Y.

Answer

We would suggest that if you have to start the gardening season and do not have your own compost, then purchase some humus. No doubt your seed dealer can get some of this humus for you. We recently purchased six tons of humus from the Hyper-Humus Co., Morris Bldg., Philadelphia, Pa., for use in our experimental work on our 63 acre farm. We tested this humus, however, and found it to be acid, which means that it probably would have to be mixed with wood ashes or lime in order to counteract the acidity. The lime should be mixed into the humus probably to the extent of about 10% by volume and mixed thoroughly with the humus. You will find this material a little expensive but when used on a small scale in the home vegetable garden, I think it pays from a health standpoint. When sickness comes, it costs money as well as time and inconvenience.

●

March 17, 1943.

Gentlemen.

In the last few months I bought a pecan grove in East Texas which is sandy soil. Stuart pecans grafted to the Hickory trees twenty years ago. How can these trees be fertilized and how long afterward does it take to get increased production? The orchard has been neglected and I am told that the trees need spraying.

H. E. V. (M.D.),
Dallas, Texas.

Answer

Replying to your letter of March 17th, we are sending you the back numbers that you did not get. Regardless whether a soil is sandy or clay, it will respond to treatment with organic materials or composts. We recommend, however, that a straw or hay mulch be placed around fruit or nut trees, but it should be kept a foot away on each side of the trunk of the tree. First apply the compost to beyond the area of the tree, about two feet beyond, and cover this section with the mulch. If you do not use a mulch, do not let grass grow under the tree, but work this grass into the soil.

Where the organic method has been followed for years, spraying should not be necessary, but in the condition that your trees are, there is a question of income and business conditions with you. In our opinion a poison spray will fall to the ground and produce a dead soil around your trees unless you can protect the soil in some way. There will be many discussions of orchard practices in our magazine.

Perhaps you may wish to start the organic method gradually, taking only a portion of your orchard and following the "no spraying" in that portion and then gradually taking in more and more of your orchard. We can safely state, however, that it would not pay you to use any chemical fertilizers in any part of your orchard but try and use as much organic material as possible.

●

March 18, 1943.

Gentlemen.

I am a subscriber to your monthly publication "Organic Gardening" and to my way of thinking I feel it is the logical plan for maintaining the vital and essential elements of the soil which have been so kind to us.

I would appreciate it if you would inform me whether or not it is essential to wash seaweed to remove the deposits before using it on a compost heap. I am further interested

to know what method of storing compost you would suggest, as ofttimes, I have on hand more material that I need for immediate use and may require some before my next heap is ready. Thank you for your kind cooperation. I am enclosing a self-addressed envelope for your convenience.

sician), South Ozone Park,
sician, South Ozone Park,
Long Island.

Answer

We have been told that seaweed is wonderful for compost heaps and decays very readily. In looking up a gardening encyclopedia, however, it stated that if the heap was watered exceptionally well that the salts of the seaweed would wash out. I would be under the impression that washing it beforehand would be better. Salt is a strong material for the earth and should be eliminated if possible.

Sir Albert Howard advises that it is best to store compost under cover and if it isn't going to be used for a long time, it should be turned occasionally. This is the ideal condition. On our farm we have had composts laying in the open for periods of a few months after completion and, no doubt, the material deteriorates slightly.

●

March 19, 1943.

Gentlemen:

"Organic Gardening", Readers' Correspondence, reports a vital need for barn manure among city dwellers for compost heaps. I wonder if anyone has made an investigation of the possibilities of using sludge from city sewage disposal plants as a substitute. When the sewage is processed a residue known as sludge is left and is run out on sand flats to drain. When thoroughly drained it is hauled out to what is known as the stock pile as a means of disposal. As a general rule it can be obtained without charge except when one must have it hauled. This sludge, according to the chemist at one of these plants, is composed of 50% mineral and 50% organic matter. About one half the organic matter is humus. The other half being of organic fertilizing value. The nitrogen content is 2 to 2½%. The phosphate content is 1½ to 2%. The potassium or potash has leaked out. This chemist also states that the chemical analysis of sludge and barn manure are very similar except for the potassium content in manure. I am not a chemist so I have no basis for verification or rejection of these statements. A warning must always be given that disease germs and other objectionable organisms are present in sludge. Composting should remove this danger. Actually experimenting with sludge may bring out objections to its use as a barn manure substitute but it seems to have possibilities that should not be overlooked without a complete investigation. Very large cities burn their sludge to reduce the volume. Most plants have available an almost unlimited supply of sludge. One central Illinois disposal plant is considering the purchase of additional land for a stock pile. They have on hand an eight year accumulation. The Springfield plant reports that the city park district, nursery men and others have kept their stock pile cleaned up. We should be able to get reports from some one who has made extensive experiments with this waste product. I expect to do some experimenting but must use up our supply of goat manure and chicken droppings before I can put sludge into a compost heap.

If there is any way that I can help further this cause please do not hesitate to give me your suggestions.

Milford C. Hunsley
208 Bruns Lane R.R. 2
Springfield, Illinois.

Answer

This question brings up the use of human excrement in the compost heap. The Chinese have done it for forty centuries or more. Sir Albert Howard is in favor of it and it is being done to a certain extent in England and other foreign countries. Dr. Ehrenfried Pfeiffer, exponent of the biodynamic method of farming and gardening, is not in favor of it. We have adopted the attitude that we should first use up the millions of tons of plant and animal residues which are wasted in this country every year. At a later date, laboratory and field tests should be made to see whether the heat in the compost heap actually kills off all the dangerous, disease-producing bacteria and other such organisms. Until such time, sludge might be used on grass, ornamental trees, shrubbery, etc. We used some sludge in one compost heap as an experiment and after 5 months we found that it did not break down.

March 3, 1943.

Gentlemen:

Some of the beneficial insects which are killed by indiscriminate dusting and poisoning are:

Ladybird beetles.

Lacewing flies; they produce the "aphis lions" which devour large quantities of plant lice.

Wild bees of many kinds. They live on nectar and are valuable in pollenizing plants and trees.

Honeybees. Because so many bees are killed when spraying of orchards occurs when the trees are in full bloom, some states have passed laws preventing spraying at such times. The bees, in addition to making honey produce even greater benefits in pollenizing trees.

Parasitic insects, such as flies and wasps which feed on nectar but lay their eggs on caterpillars or paralyzed insects.

Undoubtedly, there are others, but these come to mind at once.

Edwin W. Teale

(Editor's Note: Mr. Teale is a recognized writer. His latest book has just been published by Dodd, Mead and Company, called, "The Story of an Insect Garden." $3.75, 319 pages.)

●

March 17, 1943.

Dr. Maurice M. Samuels
Rural Electrification Administration
St. Louis, Mo.

Dear Dr. Samuels:

In an issue of the SCIENCE DIGEST we recently read of a statement which you made as follows: "When the war is over, high frequencies may have a great many applications on the farm. It may be possible to apply high frequency for soil treatment."

It stated in this article that experiments, which have already been made, show that by treating the soil with electricity in the form of a current, undesirable weeds and insect pests can be eliminated.

In our opinion, we believe that such methods should be approached with extreme caution in dealing with the soil. The danger is that along with undesirable insects, that this method will kill off also desirable forms of insect life, bacteria and most important of all, the common garden earthworm. This subject is in its infancy, no doubt, and we would like very much to hear from you as to whether such currents are strong enough to kill bacteria and the earthworm.

The earthworm, which is nature's plow and producer of top soil, is, I believe, necessary in the scheme of life and it is possible that without this little creature, man would eventually cease to exist. We would like to hear from you.

Sincerely yours,
ORGANIC GARDENING
J. I. Rodale, Editor

Answer

March 26, 1943.

Mr. J. I. Rodale
Editor, Organic Gardening
Emmaus, Pennsylvania

Dear Mr. Rodale:

Your letter of March 17 addressed to Mr. M. M. Samuels, Chief, Technical Standards Division, has been referred to this Section for reply. We appreciated receiving your comments relative to the possible shortcomings of soil treatment by electricity.

Certainly, you are correct in that there is always the possibility of destroying beneficial insects, bacteria and other living creatures while at the same time, destroyng those which are harmful. In watching the development of equipment of this nature for the past fifteen years, we have been cognizant of that fact. On many occasions the question has been raised as to how weeds and grub worms, as an example, could be eliminated electrically and at the same time, increase the productive capacity of the soil. Perhaps you have some definite ideas on this subject. We would appreciate hearing from you and giving us the benefit of your experiences in this particular field.

Again, we wish to thank you for your worthwhile comments.

Very truly yours,
J. P. Schaenzer, Acting Head
Special Problems Section
Technical Standards Division

●

April 2, 1943.

J. P. Schaenzer,
Technical Standards Division
U. S. Dept. of Agriculture
Rural Electrif. Adm.
St. Louis, Mo.

Dear Mr. Schaenzer:

In the experiences of those who have practiced farming and gardening in the organic manner, that is without the use of the so-called chemical fertilizers and poisonous sprays but

with organic fertilizers such as humus, compost, green manure crops etc., the ravages of insects seem to be reduced to a negligible minimum. We will never be able to kill off *all* insects because no doubt they were put into the cycle of nature or evolution for some purpose.

My own experiences are only about 18 months old in extent but I have already seen in a limited way the truth of the above statement. On our 63 acre farm we are practicing this organic method, but it will be two or three years before we will see substantial results. Insect infestations today are far worse than they were in the days when little if any chemical fertilizers were used. Old farmers tell me that when they were boys they had little trouble with potatoe bugs, and it seems to be getting worse and worse each year.

To correct this sad situation scientists are producing more and more deadly poison sprays, which makes the soil less and less alive as times goes on. Eventually the farmer will be faced with a completely dead soil, with no beneficent bacteria to help along as nature intended. This will in turn require still more potent poisons to kill off the insects and disease organisms which will be brought about by this violation of the scheme of nature; a vicious cycle which may have a disastrous end.

It is not very easy to say to a learned scientist, "you are in the wrong", but I do say, examine the consequences of your experiments from every possible angle. The killing off of beneficial soil organisms by electricity may not have a noticeable effect for many years but it is not necessary to wait that long for proof. Laboratory tests can show the results of application of electricity to the soil by analyzing the bacterial and earthworm life after such applications.

Under separate cover I am sending you a few numbers of our magazine. You ought to purchase Sir Albert Howard's book, "An Agricultural Testament" (Oxford Press). It gives the whole story.

Sincerely,
ORGANIC GARDENING
J. I. Rodale

●

New York, N. Y.
March 19, 1943

Dear Mr. Rodale:

At the discussion on Victory gardens at the meeting of the Arthur Manor Association on March 17th, I made considerable mention of organic gardening.

At that meeting, a friend whom I have known for many years made the statement, which to me was startling, that he had sold *tons* of arsenate of lead to the Country Club for their golf course, and likewise to other country clubs in Westchester County and elsewhere. A representative of a Tree Service, which for years has been trimming and nurturing thousands of trees on the beautiful estates in Westchester County, told me of their recommended practice to spread arsenate of lead on the lawns everywhere, a certain number of pounds (I wish I could remember that figure) to each hundred square feet, to destroy obnoxious insects. For some years we have had the Japanese beetle scourge in Westchester County and neighboring areas.

For several years I was a subscriber to the publications of Consumers' Research, of Washington, N. J., a group which gave advice to subscribers as to what to buy and what not to buy of all kinds of commodities advertised. Consumers' Research were telling us over and over again that the beautiful fruits grown in the far west were in many cases highly contaminated with arsenate of lead. The fruit growers perhaps tried to do their spraying long before the fruit matured, but traces of the poison were found by analysis in tested samples of the fruit, and sometimes enough to be highly dangerous to health. Consumers' Research did much testing of their own and had some of it done in laboratories operated by others. I remember a letter of theirs which states that thousands of acres of fruit-growing orchards in the far west were permanently contaminated with repeated applications of arsenate of lead. J. P. Schlink is, or was, one of the prime movers in Consumers' Research.

I know this, that the village of Scarsdale has made it a habit every spring to spray with arsenate of lead the trees along all the streets of the village. My next-door neighbor once dusted his whole property with it.

The top soil of America is being poisoned as well as denuded. We are doing a job as fast and as thorough as a machine age can do it. Other past civilizations have done it in

"SOILUTION EARTHWORMS"

THE AUTOMATIC GARDENER

Soil Rejuvenators
Nature's Plow
Nature's Chemist
Nature's Humus Makers
Conservors of Waste
Put Nature to Work While You Labor or Rest
EARTHWORMS Raised and Seasoned to Hard Winters and Summers.

OHIO EARTHWORM FARMS
THE WARNER'S
WORTHINGTON, OHIO.

EARTHWORMS

New Domesticated "Soilution" earthworms for horticultural and other purposes.

Arrangements may be made for personal instruction in the raising and handling of California Soilution Earthworms. Write for details.

Information regarding beneficial use of "Soilution" earthworms in connection with poultry and rabbit raising sent upon request.

California Earthworm Farms
Dept. OFG — 324 Acacia St.,
Ontario, California

SUBSCRIBE TO

ORGANIC GARDENING

Devoted exclusively to demonstrate that organic gardening is the only practical way to garden. Each month there will be presented many unusual articles, hints, short-cuts, new discoveries, etc. This magazine will be worth many times its subscription price to you. Issued 10 times a year—No issues for October and December.

ORGANIC GARDENING
Emmaus, Pa.

Gentlemen:

Enclosed is $2.00 for one year subscription (10 issues) to Organic Gardening.

NAME .....

.....

ADDRESS .....

.....

Asia. Pictures of the waste land there are very d e p r e s s i n g. Can't we leave posterity something better?

Everyone should be made acquainted with the permanently poisonous nature of arsenate of lead. Arsenic is one of the chemical elements. So is lead. Both remain permanently poisonous to the end of time. Both are solids and the compound of the two is also a solid. Washed into the ground, this poison will permeate everything, and it cannot be removed. A r s e n i c and lead, wherever found in the earth, should be kept away, by a l l possible means, from the soil. The earth does not belong to this generation a l o n e. We should leave it better than we found it, not worse. H o w blind we all have been! I bought some of the stuff myself a few years ago, and would not *give* it away. I do not want anybody to use it for its intended purpose.

We are eliminating the rattlesnakes. By the u s e of arsenate of lead we are eliminating the human race and every other living thing.

If we are going to s a v e America's topsoil, the population which has gravitated to the cities must be thrown back upon the land so that there will be enough people per square mile to watch every square rod of tillable land; to see to it that everything that square rod needs it will get—vegetables refuse, animal refuse, lime, composted by the Indore Method. Also this, every square rod can be watched for the effective eradication of objectionable insects. I do not think the Indore Process will immediately remove all of them. The unwanted insects must be destroyed with more intelligent methods than those which have been used.

The crowding of the people into the cities while tractors do all the h a r d work formerly done by slaves is not a permanently good arrangement. The oil and gasoline will not last forever, particularly the way we are using it now. Even if we cannot n o w, at a moment's notice, change our habits and abodes and do all t h e things we should do, let us at least save the topsoil for future generations. Let us put back upon it all the animal and vegetable matter that rises from it, just as all the animals and as pre-historic man did for a million years. Let us also refrain from poisoning any part of the t o p s o i l. Other generations may not want to play golf.

Beautiful Westchester with your parkways and your landed estates! You are beautiful now, but if you can't mend your ways you will rot! Your fertile soil is disappearing and is b e i n g poisoned as well. Your birds, squirrels, and all t h e other small living things that made the primeval forest so interesting are going. They put their bit on the topsoil as have all living creatures except civilized man.

When we lose the topsoil we lose all—

Christ predicted the falling of the Temple of Jerusalem, and the Temple fell. Humanity is going the wrong way and must about-face quickly, or all that we prize most highly will fall.

Sincerely yours,
H. C. Haas

(Conitnued from inside front cover)

So much for Barbados. What has been happening in the other islands—Trinidad, Grenada, Antigua, Jamaica, and the rest—where the proper balance between cultivated plant and live stock has almost disappeared, and where the crops depend largely on artificials? In cacao, bananas, citrus and other fruits, the story outlined above in the case of the Barbados sugar-cane has been repeated. The various plantation industries have all showed signs of collapse. But this is not all. The population, and particularly the labor force, soon began to show definite signs of malnutrition, followed by unrest and even riots. Just before the present war matters had deteriorated to such an extent that a Royal Commission was sent out by Parliament to go into the whole economy of the islands on the spot and to suggest remedies. One result has been the voting of a large sum of money to place the West Indies on their feet again. Schemes have been prepared and are now being set in motion. One of these is referred to in *The Times* of December 24th last as follows:-

FARMING IN BARBADOS
Far-Reaching Plans for Development

"Co-ordinated schemes have been submitted to the Legislature, mainly on the recommendation of the Inspector-General for Agriculture in the West Indies, Mr. A. J. Wakefield, for the agricultural development of Barbados. An application under the Colonial Development and Welfare Act is proposed for free grants totalling £171,810, and loans amounting to £40,000 for schemes to develop an intensive system of mixed farming based on animal husbandry.

It is proposed to establish stock-breeding and agricultural stations, to extend irrigation, to liberalize the Peasants' Loan Bank, and to encourage co-operative methods of production and marketing. The agricultural plan is warmly welcomed as a means of saving Barbados from the evil consequences of one-crop specialization."

In one respect this announcement is misleading. One-crop specialization in itself is not necessarily harmful, as is proved by the fact that certain areas of the East have good crops of rice on the same land for at least twenty centuries. The cause of the trouble in Barbados has been failure to recognize and to obey Nature's law of return. Instead an attempt has been made to improve on Nature—to paint the lily in fact—with results which have ended in complete failure.

If a real effort is made in Barbados and the other West Indian islands to carry out Nature's law of return and to see that soil fertility is fully restored and then maintained by freshly prepared humus, and if the use of artificials is given up as soon as possible, there can be no question that the prospects of these old Colonies will soon improve. Besides the general restoration of soil fertility, an effort might be made in the sugar islands to introduce the Shahjahanpur method of cane cultivation and to copy the spectacular results which Clarke obtained and applied in the United Provinces of India between 1912 and 1931. An account of this work will be found in Chapter XIV of *An Agricultural Testament*. The time has come to carry the message it contains to the West Indies.

Sunflowers

Every vegetable gardener should grow some sunflowers, with a liberal supply of compost or purchased humus. Eat these sunflower seeds during the fall and winter months. They keep very easily and are full of nutritious qualities.

Crust

If the soil of your garden is clayey, don't let the rain build up a brick-like crust. Unless clay soils are protected, a hard rain will change the texture of the top layer by driving the coarse particles down and bringing the fine brick-making particles up. A covering application of peat moss, manure, or even sawdust will prevent this distressing action.—*Sunset Magazine.*

EDITOR'S NOTE:—A straw or hay mulch will prevent the formation of a crust.

AN AGRICULTURAL TESTAMENT

By Sir Albert Howard, C. I. E., M. A.

Formerly Director Institute of Plant Industry Indore, and Agricultural Adviser to Central India and Rajputana.

Sir Albert Howard C. I. E., M. A.

CONTENTS

1 Introduction

Part i

The Part Played By Soil Fertility In Agriculture

2 The Nature of Soil Fertility
3 The Restoration of Fertility

Part II

The Indore Process

4 The Indore Process
5 Practical Application of the Indore Process
6 Developments of the Indore Process (A)
7 Developments of the Indore Process (B)
8 Developments of the Indore Process (C)

Part III

Health, Indisposition, and Disease in Agriculture

9 Soil Aeration
10 Some Diseases of the Soil
11 The Retreat of the Crop and the Animal Before the Parasite.
12 Soil Fertility and National Health

Part IV

Agricultural Research

13 A Criticism of Present-day Agricultural Research
14 A Successful Example of Agricultural Research

Part V

Conclusions and Suggestions

15 A Final Survey
Appendixes

This is the recognized standard text book for gardeners and farmers who wish to change from the use of ordinary chemical fertilizers to home-made organic fertilizers. Sir Albert Howard has forty years of active experience in the field of organic fertilizers and is the accepted leading authority on the subject. These books are printed in England and owing to war conditions are rather difficult to obtain. We succeeded in securing a limited supply and while they last we are offering them at their regular price.

Price $4.50

Postpaid

RODALE PRESS

Emmaus, Penna.